This listing of claims will replace all prior versions and listings of claims in this application:

b.) Listing of Claims

1. (Currently amended) A method for optical-light scanning of a specimen ~~using a scanning microscope with an optical element~~, the method comprising:

providing a scanning microscope with an acousto-optical element

providing a focused light beam, wherein the focused light beam defines a beam path characterized by a light beam intensity;

scanning across a specimen region with the focused light beam ~~across a specimen region~~ to define a current focus position; and

using the acousto-optical element disposed along the beam path to regulate the light beam intensity by determining a function of the current focus position of the focused light beam in the specimen region.

2. (Previously amended) The method as defined in Claim 1, wherein using the optical element comprises determining the function of a current axial focus position.

3. (Currently amended) The method as defined in Claim 1, wherein using the acousto-optical element comprises determining the function of a current lateral focus position.

4. (Previously amended) The method as defined in Claim 1, wherein the current focus position is defined by a user.

5. (Currently amended) The method as defined in Claim 1, further comprising mounting the specimen on a mounting medium, the mounting medium defining a refractive index, wherein using the acousto-optical element comprises determining the function of the refractive index.

6. (Currently amended) The method as defined in Claim 1, wherein using the acousto-optical element disposed along the beam path to regulate the light beam intensity by determining a function of the current focus position further comprises utilizing an expert system implemented in a control computer of the scanning microscope in conjunction with the optical element.

7. (Previously amended) The method as defined in Claim 1, further comprising:

recording data; and

visualizing the data based on the information about the light beam intensity at the step of recording.

8. (Previously amended) The method as defined in Claim 7, further comprising implementing a computer restoration method or a digital reconstruction method by using the information about the light beam intensity at the recording step.

9. (Canceled)

10. (Currently amended) The method as defined in Claim 1, wherein the acousto-optical element is ~~an active optical element comprising~~ an acousto-optical modulator (AOM), an acousto-optical tunable filter (AOTF) or an acousto-optical deflector (AOD).

11. (Canceled)

12. (Canceled)

13. (Currently amended) The method as defined in Claim 1, wherein the focused light beam is generated by a light source and wherein using the acousto-optical element to regulate the light beam intensity comprises varying the intensity of the light source.

14. (Currently amended) The method as defined in Claim 6, wherein the control computer controls the acousto-optical element and a light source.

15. (Previously amended) The method of Claim 1, further comprising;

providing a transmission detection apparatus coupled with the scanning microscope using the transmission detection apparatus to detect a maximum signal yield as a function of the current focus position in the specimen region.

16. (Previously amended) The method as defined in Claim 15, wherein the transmission detection apparatus comprises a lens system responsive to a function of a current axial focus position.

17. (Previously amended) The method as defined in Claim 16, wherein the lens system is disposed in an axial direction.

18. (Previously amended) The method of Claim 16, further comprising the lens system having a magnification and being responsive to the function by changing the magnification.

19. (Previously amended) The method of Claim 16, further comprising a transmission detector coupled to the transmission detection apparatus and responsive to a function of the current focus position.

20. (Previously amended) The method of Claim 19, wherein the transmission detector is responsive to the function of the current focus position by being positioned in an axial direction.

21. (Currently amended) A scanning microscope for scanning a specimen comprising:

a light source for generating a focused light beam defining a beam path of a light beam intensity;

means for scanning across a specimen region with the focused light beam ~~across a specimen region~~ to define a current focus position, and

an acousto-optical element disposed along the beam path for regulating the light beam intensity, by determining a function of the current focus position in the specimen region of the focused light beam.

22. (Currently amended) The scanning microscope as defined in Claim 21, wherein the acousto-optical element for regulating the light beam intensity further comprises means for regulating the light beam intensity of the focused light beam as a function of a current axial focus position.

23. (Currently amended) The scanning microscope as defined in Claim 21, wherein the acousto-optical element for regulating the light beam intensity further comprises means for regulating the light beam intensity of the focused light beam as a function of a current lateral focus position.

24. (Previously amended) The scanning microscope as defined in Claim 21, further comprising means for defining focus positions in the specimen region by a user.

25. (Previously amended) The scanning microscope as defined in Claim 21, further comprising a control computer, with an expert system to regulate the light beam intensity.

26. (Previously amended) The scanning microscope as defined in Claim 21, further comprising means for recording and visualizing data in response to regulation of the light beam intensity during the recording of the data.

27. (Currently amended) The scanning microscope as defined in Claim 21, wherein the acousto-optical element for regulating the light beam intensity is an active optical element.

28. (Currently amended) The scanning microscope as defined in Claim 27, wherein the acousto-optical element is an acousto-optical modulator (AOM), an acousto-optical tunable filter (AOTF) or an acousto-optical deflector (AOD).

29. (Canceled)

30. (Canceled)

31. (Previously amended) The scanning microscope as defined in Claim 21, wherein the light beam intensity is regulated by regulating the intensity of the light source.

32. (Currently amended) The scanning microscope as defined in Claim 21, wherein the light source and the acousto-optical element for regulating the light beam intensity is operated by a control computer.

33. (Previously amended) The scanning microscope as defined in Claim 21, further comprising a transmission detection apparatus adapted in a manner responsive to the current focus position to receive a signal yield.

34. (Previously amended) The scanning microscope as defined in Claim 33, wherein the transmission detection apparatus comprises a lens system responsive to a current axial focus position.

35. (Previously amended) The scanning microscope as defined in Claim 34, wherein the lens system is responsive to the current axial focus position by positioning the lens system in an axial direction.

36. (Previously amended) The scanning microscope as defined in Claims 34, wherein the lens system is characterized by a magnification and is responsive to the function by changing the magnification.

37. (Previously amended) The scanning microscope as defined Claims 34, wherein the transmission detection apparatus comprises a transmission detector responsive to the current focus position.

38. (Previously amended) The scanning microscope as defined in Claim 37, wherein the transmission detector is positioned in an axial direction.

39. (Previously amended) The scanning microscope as defined in Claim 21, wherein the specimen to be scanned is excited using a one-photon excitation process.

40. (Previously amended) The scanning microscope as defined in Claim 21, wherein the specimen to be scanned is excited using a two-photon excitation process.

41. (Previously amended) The scanning microscope as defined in Claim 21, wherein the specimen to be scanned is excited using a multi-photon excitation.